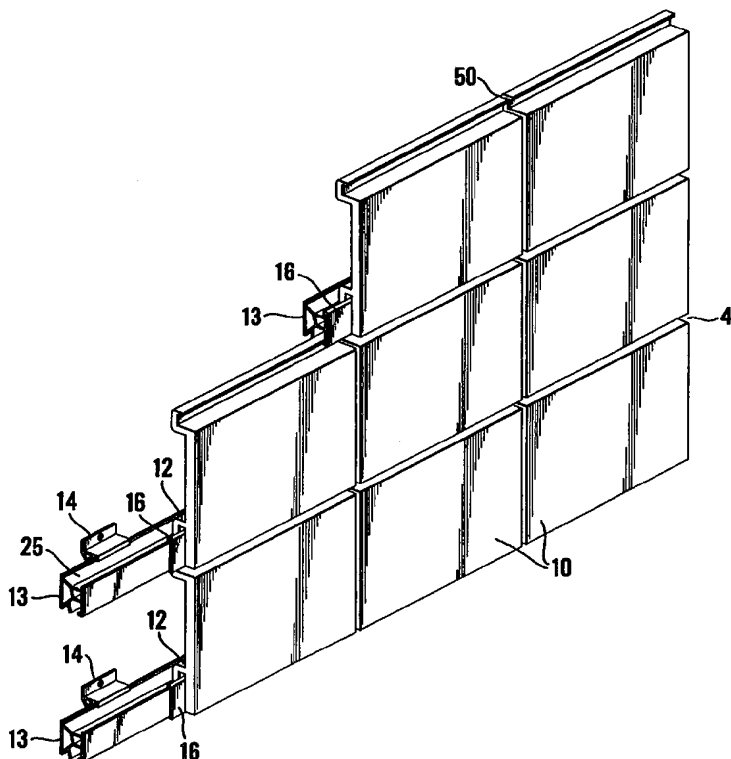


## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/GB97/03382  <b>(22) International Filing Date:</b> 8 December 1997 (08.12.97)  <b>(30) Priority Data:</b> <table border="0"> <tr> <td>9625490.9</td><td>7 December 1996 (07.12.96)</td><td>GB</td></tr> <tr> <td>9701690.1</td><td>28 January 1997 (28.01.97)</td><td>GB</td></tr> <tr> <td>9708418.0</td><td>26 April 1997 (26.04.97)</td><td>GB</td></tr> <tr> <td>9718827.0</td><td>5 September 1997 (05.09.97)</td><td>GB</td></tr> </table> <b>(71) Applicant (for all designated States except US):</b> BIANCO TEAM LIMITED [GB/GB]; Clock House, Cowfold, Horsham, West Sussex RH13 8DF (GB).  <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> CAPO-BIANCO, Anthony, James [GB/GB]; Clock House, Cowfold, Horsham, West Sussex RH13 8DF (GB). MOSELEY, Peter, Litchfield [GB/GB]; 30 Drive Lodge, 70 The Drive, Hove, East Sussex BN3 3PS (GB).  <b>(74) Agent:</b> DEARING-LAMBERT, Peter, Richard; Lewis & Taylor, 144 New Walk, Leicester LE1 7JA (GB).		9625490.9	7 December 1996 (07.12.96)	GB	9701690.1	28 January 1997 (28.01.97)	GB	9708418.0	26 April 1997 (26.04.97)	GB	9718827.0	5 September 1997 (05.09.97)	GB	<b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
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**(54) Title:** CLAYWARE WALL CLADDING**(57) Abstract**

A clayware rainscreen is constructed from tiles (10) by locating them on horizontal rails (13) fixed by brackets (14) to the inner structure (not shown) to be clad, such as an inner wall or timber frame. The brackets (14) can be slid along the rails (13) suitably to position fixing screws (15). Each tile (10) is supported on a rail (13) by means of a rear nib (12) which has a downstand each corner of which rests on a resilient seating element (16) such that each seating element (16) supports the adjacent nib corners of two adjacent tiles (10). Each rail (13) has a downwardly sloping top surface (25) which sheds water penetrating the gaps (50) in the screen to the front of the screen between seating elements (16). Each tile (10) has a cranked upper end (11) which enters a concavity (20) under the rail above. Each seating element (16) has an upstand (32) and the arrangement is such that a tile (10) cannot be first lifted and then swung out of the screen (arrow A) while seating elements (16) are below it. A tool (36) may be used to slide the seating elements (16) along the rails (13) from beneath the tiles (10) enabling them to be removed. In a preferred embodiment all but one vertical row of tiles are supported by seating elements (16) which have a central partition (35) and the vertical gap (50) between adjacent vertical rows of tiles is filled by spacer elements (40) which are supported by location elements (42) engaging the rails (13).



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## "CLAYWARE WALL CLADDING"

This invention relates to clayware wall cladding, by which is meant the construction of a screen of clayware plates or tiles to provide the outer, exposed leaf of a cavity wall. Such cladding may provide a rain screen for a new timber, metal or concrete frame or masonry structure or it may be applied as overladding to an existing wall to provide an ornamental exterior effect, for example by simulating brickwork, at the same time enhancing weatherproofing and providing the insulating benefits of a cavity wall. European Patent Specification No. 0 278 842 exemplifies clayware wall cladding of the kind with which the present invention is concerned.

As described in that Specification, plates or tiles of clayware may be hung in horizontal rows upon respective wooden battens fixed in vertically spaced relation to an inner wall or like structure to be clad. In addition to a rearwardly-extending nib by which it is hung each plate or tile also has a downwardly-opening female formation which will receive the upper edge of a similar plate or tile next below it, and in this way the plates or tiles making up each vertical row are interlocked.

The width of the cavity between the inner wall and the rain screen afforded by the clayware is determined by the widths of the battens (and any counter battens or like vertical supports) fixed to the inner structure. For some purposes this may be insufficient and in general it may be preferred not to use wooden battens as the supporting means for the clayware. Among the reasons is the fact that wooden battens require support at relatively short horizontal intervals. This requires that vertical supports for the battens should also be provided at relatively closely spaced horizontal intervals, giving rise to a relatively costly structure which is also labour intensive to create. Alternatives which have been proposed are simple metal rails or brackets, but rails present the problem that holes provided along the length of a rail for the reception of fixing screws may in practice not be conveniently aligned when the rail is presented to the inner structure to which it is to be fixed, whereas it is difficult to locate a number of individual brackets accurately in a horizontal row.

Although visually attractive and relatively inexpensive to manufacture and install clayware wall cladding presents a number of other problems. The plates or tiles, made by moulding or extruding and then firing clayware, are relatively fragile and friable. If they are formed with interlocking end regions or with nibs by which they are to be suspended these are particularly vulnerable to damage, for example from metal fittings with which the nibs cooperate. When clayware plates or tiles are hung directly, by means of the nibs with

which they are formed, on metal brackets or hard wooden battens, they may not "sit" properly and may be skewed relative to surrounding plates or tiles. In an arrangement such as disclosed in European Patent Specification No. 0 278 842 it is possible for individual tiles to be lifted relative to the battens on which they hang, thereby displacing or damaging adjacent tiles. This makes the clad wall vulnerable to vandalism and in an extreme case a sufficiently high wind, or for example subjection of the wall to a high powered water hose, could cause an entire vertical array of tiles to lift from the battens or brackets on which they hang.

A clayware screen is not intended to be fully water impermeable and in fact ventilation through the screen is necessary, but of course any air gap, whether intentional or not, will permit the ingress of rainwater, if only when driven by the wind. If the typical height of a tile is around 250 mm the height of a horizontal course of such tiles will be approximately the same - less in the case of overlapping tiles. Given a screen extending the full height of a building such as a house a considerable volume of water can penetrate the screen, and if the water penetrating each horizontal course of tiles is added to that penetrating the course next below it will be evident that a great volume of water will accumulate behind lower courses. A preferred embodiment of the present invention avoids this problem by providing an arrangement whereby at least the greater part of any water penetrating a given horizontal course of tiles is shed to the front of the screen at the bottom of said course instead of passing behind the course next below.

To achieve particular aesthetic effects it is desirable that the gap between two adjacent vertical rows of tiles, or at least some of the rows making up a wall, should be relatively wide - say 8 mm - but this will permit excessive ingress of rain water especially when driven by wind. If the gap is very small - say 2 mm - any such ingress will be minimal because rain drops will be dispersed by the tile edges as they attempt to enter the narrow gap and will drip down the tile edges. To fill a relatively wide gap the obvious solution would be to provide long, narrow spacers extending the full height of the wall. These would have the advantage of assisting in aligning the adjacent vertical rows of tiles, but if used in connection with a preferred embodiment of the present invention they would prevent lateral movement of the adjacent tiles and thus make it impossible to build or disassemble a wall in the manner to be described.

Principal objects of the present invention are to improve upon prior art proposals and to mitigate or overcome some of the problems associated therewith.

In accordance with the present invention there is provided clayware wall cladding comprising a support structure for clayware cladding plates or tiles characterised in that it comprises a rail and a plurality of support brackets engaged with the rail so as to prevent relative rotation but so as to permit sliding of each bracket along the length of the rail, each bracket being apertured for the insertion of fixing screws or like members and the rail having a shape such that hanging nibs of clayware plates or tiles may be located over it to hang a horizontal row of said plates or tiles on the rail.

Each bracket may comprise on one side thereof a pair of vertically spaced channels respectively slideably engageable by a pair of vertically spaced, flanges on one side of the rail.

The rail may be of hollow, box-section.

The rail may have a downwardly sloping upper surface.

A plurality of seating elements may be provided adapted to be positioned in spaced relation along the rail such that each extends between two horizontally adjacent tiles supported by the rail.

The arrangement is preferably such that water reaching said sloping surface of the rail will be shed between adjacent ones of said seating elements to a position in front of tiles constituting a horizontal course next below that supported by the rail.

In clayware cladding comprising two horizontal courses of similar tiles one above and the other below the rail, the lower part of the rail preferably has a downwardly-opening concavity to receive a cranked, upper formation of each tile of the course below the rail such that outer surfaces of the tiles of the two courses lie generally in the same plane.

The upper extremity of each said cranked portion of a tile preferably has a forwardly extending nib located above a rearwardly extending nose bounding the forward side of said concavity of the rail.

Said concavity of the rail is preferably bounded to the rear by a downwardly and forwardly extending flange which contacts the rear surfaces of the cranked portions of the tiles below the rails.

Each seating element preferably has an upward projection in front of the downstand of each nib supported thereby such that, with a seating element located between a tile and the rail by which it is supported, said tile cannot be lifted sufficiently for the downstand of its nib to clear said upward projection before the cranked upper region of said tile encounters the underside of the rail next above, and the seating elements are preferably slideable along the associated rails to permit the two seating elements supporting a given tile to be moved laterally away from the tile along the associated rail, after which said tile may be first lifted and then swung outwardly of the screen to permit its removal.

The seating elements each may have a flat supporting surface extending rearwardly behind said upward projection thereof, the supporting surfaces of at least some of said seating elements being divided by an upstanding partition located between the two tiles supported thereby, the arrangement being such that said at least some seating elements cannot be slid along the associated rail(s) until one of said two tiles has been removed.

In a preferred construction none of the seating elements associated with one vertical row of the tiles making up the screen is provided with a said partition such that seating elements associated with the tiles of said row only may be slid away from said row without first removing any tile from the screen.

The seating elements are preferably accessible from in front of the screen through the gap between the cranked upper region of a tile and the lower edge of the tile immediately above and a tool is preferably provided which has an elongate operating part at right angles to a shank, the operating part being insertable in said gap between two adjacent seating elements while held in a horizontal attitude and then rotated to a vertical attitude in which it may be moved laterally to displace a seating element along the associated support member.

The seating elements associated with said one vertical row of tiles preferably each is identifiable from in front of the rainscreen through the associated said gap by means of markings, coloration or the like which distinguishes seating elements having partitions from seating elements lacking the same.

In accordance with another aspect of the present invention there is provided a method of assembling a clayware rainscreen which comprises locating vertically spaced rails in front of an inner structure to be clad by means of brackets each slideable along the associated rail and locating on each rail a horizontal course of clayware tiles or the like by means of a nib extending rearwardly of each tile and having a downstand such that upper, cranked regions

of the tiles of a lower course are received in a downward concavity of the rail on which the course next above is located and such that front surfaces of all of the tiles lie generally in the same vertical plane, characterised in that seating elements more resilient than the rails are slideably located thereon and moved therealong to positions in which each seating element will support adjacent corners of the nibs of adjacent tiles in a course with a gap between adjacent seating elements through which rainwater may escape to the front of the screen.

There may be used in the method of the immediately preceding paragraph seating elements which have flat supporting surfaces all but some of which are divided by a partition which will extend into the gap between the two tiles supported thereby, and the method may comprise selecting said some seating elements each lacking a said partition to support the tiles making up one vertical row of the tiles, in the case of all other vertical rows of tiles the seating elements being slid under exposed lateral edges of the tiles until abutted by the partitions and in the case only of said one vertical row the seating elements lacking partitions being slid from beneath tiles adjacent said row to positions where they will support the tiles of said row.

The method of the two immediately preceding paragraphs may comprise inserting a tool into the gap between vertically adjacent tiles of said one row or in the gap between vertically adjacent tiles of an adjacent row and utilising the tool to slide seating elements lacking partitions either beneath or away from the corners of tiles making up said one row.

The tolerances are preferably such that a tile cannot be removed from its support while seating elements are beneath it but such that a tile can be lifted to permit a seating element to be slid under or away from the tile.

When clayware wall cladding in accordance with the invention comprises horizontal courses of clayware tiles or the like supported by respective, horizontal rails such that the tiles form vertically-aligned rows between any two of which a vertical gap exists which is substantially filled by a vertical spacer element, the spacer element may be made up of individual portions of its length, each said portion bridging a respective one of the horizontal intervals between the tiles of one course and the tiles of the course next above or below it, each said portion being held in position commonly with another portion above or below the same by a location element which engages the rail nearest to said horizontal interval, each said location element comprising a head portion to engage said rail and a tail portion depending from said head portion, said tail portion comprising means to retain one

end of each of two spacer element portions extending respectively upwardly and downwardly from the location element.

The said downwardly-opening concavity of each rail may have a relatively restricted, horizontally elongated opening and the head portion of each location element may be shaped such that it may be inserted through said opening from below with said location element in a first attitude after which the location element may be rotated through 90° to a second, operative attitude in which the head portion is trapped in the concavity.

The said retaining means of each said location means tail portion may comprise oppositely-opening channels into each of which a respective end of a spacer element portion may be slid laterally.

Each said location means tail portion may comprise lateral fins which, in the operative position of the location means, extend downwardly and inwardly with respect to the tiles next below the head portion of said location means so as to deflect toward the rear faces of the same any water penetrating the said horizontal interval.

Preferred embodiments of the present invention will now be described, by way of example only, with reference to the accompanying Drawings, in which:

Figure 1 is a perspective view from in front of part of a clayware cladding system in accordance with the invention,

Figure 2 is a cross sectional view on a larger scale of part of the assembly of Figure 1,

Figure 3 is a view similar to Figure 2 but illustrating an alternative embodiment of the invention,

Figures 4A-4C are respectively a side and front elevation and a top view of the element 16 of Figure 3,

Figures 5A and 5B are respectively a side elevation and a view from above of a tool for use in connection with the assembly of Figure 3,

Figure 6 is a view similar to Figures 2 and 3 of a system in accordance with the invention in which spacer elements 40 and their supports 42 have been included, and

Figure 7 illustrates the spacer elements 40 and one of their supports 42 in isolation and on a larger scale.

The overall construction of the rainscreen of the invention can best be appreciated from Figure 1. It is constituted by similar, generally rectangular clayware tiles 10 supported



by horizontal rails 13 such that the front surfaces of the tiles (i.e. those remote from the rails) lie generally in the same, vertical plane. Vertical 50 and horizontal 41 gaps exist between the courses of tiles 10 which are aesthetically pleasing and functionally acceptable, because the purpose of the cladding is to provide an outer skin to a building which protects an inner structure (wall frame or the like) to which the rails 13 are secured by brackets 14 from the effects of heavy rain and solar radiation, but the acceptance of some water penetration through the rainscreen permits ventilation and avoids the need for sealants and mastics. Thermal movement between the tiles and their supports is permitted without the risk of joint failure.

In the construction illustrated each tile 10 has a cranked upper edge portion 11 and in the region of its lower edge a rearwardly-extending nib 12. The nibs 12 of a horizontal row or course of tiles 10 are commonly supported by a rail 13, which is conveniently fabricated as a hollow extrusion either of metal or a plastics material. Slidably engaging the rail 13 are a plurality of brackets 14. When fixing the rail 13 to extend horizontally across a support structure, such as a timber framework, the brackets 14 are slid along rail 13 to positions where they can be fixed to the support structure by screws 15.

Between each horizontally adjacent pair of tiles 10 in a given row or course of such tiles a seating element 16, conveniently of a plastics material, engages the rail 13 and provides a supporting surface 17 above the rail for the adjacent ends of the nibs 12 of adjacent tiles.

However the seating elements 16 are not co-extensive with rail 13 so that a gap exists between two adjacent seating elements 16 through which rainwater passing behind the associated tile 10 will be shed toward the front of the tile by a downwardly-sloping, upper surface 25 of the rail. Each seating element 16 has a vertical portion 18 terminating at its bottom edge in a nose 19 whereby the element may be snap-engaged with the box-section rail 13. The gaps between portions 18 of adjacent elements 16 combine with the gaps between their portions 17 to provide a pathway for rainwater to pass in front of rail 13.

The cranked formation 11 at the top of each tile 10 is received in a downwardly-opening concavity 20 in the lower part of the rail 13 next-above said tile. This concavity 20 is bounded on its forward side by the noses 19 of seating elements engaging the rail and on its rearward side by a flange 21 of the rail. The free end of this flange 21 makes a flexible seal against the backs of the cranked portions 11 of the tiles 10 received into the concavity 20 and by this arrangement water passing between portions 18 of adjacent seating elements 16 will flow onto top surface 22 of the tile next below and thence to the front of said tile.

The upper extremity of each cranked portion 11 of a tile has a forwardly extending nib 23 which ensures that it cannot pass vertically into or out of the concavity 20 of a rail 13 without first rotating the tile about a horizontal axis. This safeguards against unintended removal of a tile, or the whole of it, for example in the event of breakage of a tile. Moreover T-shaped elements 24 are inserted in the concavities 20 of the rails following insertion of the tiles. What is visible in Figure 2 is one arm 24 of such a T-shaped element. The other arm is inserted in the corresponding space above the next-adjacent tile while the stem of the "T" extends between the two tiles, acting as a spacer element.

If made of a material more resilient than that of the rails 13 the seating elements 16 serve to protect the fragile clayware tiles 10 against fracture and also compensate for any irregularities in the manufacture of the tiles which would otherwise enable any given tile to "skew" relative to the rail 13 and relative to adjacent tiles.

In the construction of a screen using the elements illustrated in Figure 2 first a seating element 16 is snap-engaged with the rail 13 at an appropriate position along its length and then two tiles 10 have their upper ends 11 inserted in the concavity 20 of the rail next above, after which they are swung back until their nibs 12 are above the portions 17 of elements 16, after which they are dropped into position. To prevent them from being lifted again unintentionally elements 24 are inserted in concavities 20 above each tile.

In the embodiment of the invention illustrated in Figure 3 at least the majority of the seating elements 16 used in the construction of a rainscreen take the form illustrated in Figures 4A, 4B and 4C and each is slideable along the length of the associated rail 13. Each element 16 is fabricated from a material which is softer or more resilient than the material of the associated rail 13 to provide support for the corners of the nibs 12 of clayware tiles 10 which will protect them from damage and at the same time allow tolerance for slight misalignments. Each seating element 16 has a substantially C-shaped body 30 to engage the associated rail 13 and a flat, upper supporting surface 31 behind an upstand 32. The height of this upstand 32 is so calculated in relation to the vertical gap between the upper extremity 23 of a tile 10 and the underside 33 of the rail 13 above it that with seating elements 16 interposed between the nib 12 of a tile and the rail 13 on which it is resting that tile cannot be lifted sufficiently for the downstand 34 of nib 12 to clear upstands 32 of the associated seating elements 16. Therefore the tile cannot be swung outward as indicated by arrow A in Figure 3 until nib 23 at the top of its cranked, upper portion 11 can be removed from the concavity 20 in the rail 13 above.

Therefore in order to remove any tile 10 from the rainscreen the two seating elements 16 on which its nib 12 rests must first be displaced along the associated rail 13 laterally of the tile in opposite directions until there is no upstand 32 under the nib.

The seating element 16 illustrated in Figures 4A, 4B and 4C has its supporting surface 31 divided by an upstanding, fin-like partition 35. This will occupy the gap between the two adjacent tiles 10 supported by the same element 16. Obviously the element 16 cannot then be slid along the associated rail 13 without first removing one of the tiles. Therefore in accordance with this embodiment of the present invention the seating elements 16 associated with one vertical row only of the tiles 10 each lacks a partition 35. When assembling the rainscreen a first vertical row of tiles 10 is mounted on the rails 13 using partitioned seating elements 16 and the latter are slid under the tiles until their partitions 35 abut the same. A second row can then be mounted on the rails, moving each tile 10 laterally until the leading corner of its nib 12 sits on the exposed part of the surface 31 of the associated seating element 16 up against the partition 35. When a final row of tiles is to be mounted there is no longer room to move the tiles laterally into position. They have to be moved in a direction perpendicular to the rainscreen and for this reason seating elements 16 lacking partitions 35 are used for this row and for the nearer corners of the two adjacent rows only. First the non-partitioned seating elements 16 are slid fully under the tiles which they are already supporting. A tile 10 of the final row is positioned over the respective rail 13 and then the two non-partitioned seating elements 16 on opposite sides of this tile are slid under it until its nib 12 can be supported by said two seating elements jointly with the tiles 10 on opposite sides of it. In all cases to permit seating elements 16 to be slid along the rails the affected tile 10 must be lifted within the tolerance of the gap between its top surface 23 and the underside 33 of the rail above it. This can be achieved by inserting the fingers in the gap 41 between the bottom of the tile and the cranked portion 11 of the tile below it.

This gap is not large and it is undesirable that it should be or that the seating elements 16 should be readily accessible e.g. to vandals or thieves who might wish to dismantle the rainscreen. Therefore in accordance with a further feature of the invention the special tool 36 illustrated in Figures 5A and 5B is provided to facilitate removal from the rainscreen, from a position in front of it, of one of the tiles 10 supported by non-partitioned seating elements 16. The tool 36 has a thin, blade-like operating part 37 extending at right angles to a shank 38 connected to a handle 39. In use the blade 37 is presented horizontally to the gap under the tile 10 to be removed and then the shank 38 is rotated so that the blade 37 is upstanding behind the tile. The tool 36 can then be moved laterally to displace first one

and then the other of the two seating elements 16 on which the tile rests until both of them are fully under the respective tile 10 on opposite sides of the tile to be removed. The tile to be removed can now be lifted and swung outwardly as indicated by arrow A in Figure 3 until it can be removed from the rainscreen. Replacement of the tile requires that tool 36 is instead inserted under first one and then the other of the two adjacent tiles 10 fully covering the non-partitioned seating elements and by means of the tool half of the support surface 21 of each said seating element is moved beneath the nib 12 of the tile being mounted. This is now dropped into place.

It will not of course be immediately apparent from the exterior of the rainscreen which vertical row of tiles 10 is supported only by non-partitioned seating elements 16 so that its tiles can be removed. The non-partitioned seating elements are therefore marked or coloured to distinguish them from seating elements 16 having partitions 35 at least where they are visible beneath the associated tile.

It will be understood that if it is desired to replace any given tile, for example if it becomes damaged, this can be done using the two, slideable, non-partitioned seating elements 16 associated with the horizontal course of tiles in which the tile to be replaced is included.

If the tile to be replaced is not the tile supported by said two non-partitioned seating elements first the latter is removed and then others successively until the damaged tile is reached.

Alternatively more than one vertical row of tiles may be supported by non-partitioned seating elements 16, and indeed in a given rainscreen no partitioned seating elements may be used whatsoever in which case any individual tile will be removable without disturbance of other tiles.

An additional advantage in using partitions 35 is however that they serve as dams against horizontal movement of rainwater along a rail 13 and channel it to the gaps between seating elements 16. Yet another advantage is that the partitions 35 conceal the bright metal of a rail 13 as viewed through the vertical joint between tiles, as this can be unsightly.

For aesthetic reasons it may be desirable to provide a gap 50 of, say, 8 mm between adjacent vertical rows of tiles 10. In a given rainscreen all adjacent rows of tiles may have such a gap or only some of them, the remainder having a relatively narrow gap of, say, 2 mm. With a gap of around 8 mm there is a danger of excessive rain penetration, but in preventing this by the provision of a filler or spacer it is undesirable to interfere with the

ability to build the tiles 10 from the top of the rainscreen downward or from the bottom up or with the facility to remove a given tile if it becomes damaged. This will generally require that a given tile 10 can move laterally independently of tiles 10 above and below it, and this of course would not be possible if a unitary spacer element were used extending the full height of the rainscreen.

Therefore in accordance with another aspect of the present invention and with reference to Figures 6 and 7, each spacer element used to fill a relatively wide vertical gap between two adjacent vertical rows of tiles 10 is made up of discrete portions 40 each of which bridges a respective horizontal interval 41 between two adjacent horizontal courses of the tiles. By so bridging these intervals the portions 40 ensure proper vertical alignment of the tiles as they are inserted on the rails 13. As shown in Figure 7 each portion 20 may be a simple, rectangular-section strip which may be of a flexible material such as a suitable plastics material

The portions 40 making up each vertical spacer are supported by location elements 42 engaging the rails 13. This they do by inserting a head 43 of a location element in the downwardly opening concavity 20 of a rail 13 which also serves to receive the top nibs of the tiles 10 below it. This concavity has a relatively restricted mouth through which a head 43 can be inserted in a first attitude, but when the location element 42 is then rotated through 90° to its operative position as shown in Figure 6 the head 23 substantially fills the cross-section of the concavity 20 so that the location element 42 cannot move downward relative to the rail 13.

In addition to its head 43 each location element includes a depending tail portion 44 from which there extends forwardly a generally T-shaped formation 45 defining with the tail portion an upwardly opening channel 46 and a downwardly opening channel 47. The bottom of one spacer element portion 40 can slide laterally into the upper channel 46 and the top of another portion 40 can slide laterally into the lower channel 47 until the two portions 40 are in vertical alignment.

Additionally each tail portion 44 has laterally extending fins 48,48' extending forwardly and downwardly. These serve to deflect rainwater penetrating the rainscreen through each gap 41 so that it runs back to the front of the rainscreen through gaps between the elements 16.

The spacer elements made up of portions 40 are used in the following way. As successive horizontal courses of tiles are built, whether from the top of the rainscreen downward or

from the bottom up, wherever there is to be a relatively wide gap 50 between adjacent vertical rows of tiles 10 a location element 42 is inserted in each rail 13, twisted round to the operative position and then slid along the rail 13 until its tail portion 44 abuts the tile 10 already in place on one side of the gap. When a location element 42 is in place on each of two vertically adjacent rails 13 a portion 40 can be slid into place so that it is supported between the lower channel 47 of upper location element 42 and the upper channel 46 of the lower location element 42. In this way a continuous vertical spacer element is built from portions 40 as the rainscreen is built, and because each portion 40 spans or bridges the gap 41 between adjacent tiles in a horizontal course it serves to ensure that the tiles 10 are in vertical alignment as they are put in place. Of course, once the relevant part of the spacer element is in place the next tile in the same horizontal course can be slid into place against it. Disassembly of the rainscreen can be the reverse of this process.

It will be observed that the presence on a rail 13 of location elements 42 will not prevent lateral movement along the rail of support elements 16. These can therefore be displaced without removing the spacer elements, or portions 40 thereof, when it is desired to remove an individual tile from the rainscreen.

## CLAIMS:

1. Clayware wall cladding comprising a support structure for clayware cladding plates or tiles (10) characterised in that it comprises a rail (13) and a plurality of support brackets (14) engaged with the rail (13) so as to prevent relative rotation but so as to permit sliding of each bracket (14) along the length of the rail (13), each bracket (14) being apertured for the insertion of fixing screws or like members (15) and the rail (13) having a shape such that hanging nibs (12) of clayware plates or tiles (10) may be located over it to hang a horizontal row of said plates or tiles (10) on the rail (13).
2. Clayware wall cladding as claimed in claim 1, characterised in that each bracket (14) comprises on one side thereof a pair of vertically spaced channels respectively slideably engageable by a pair of vertically spaced, flanges on one side of the rail (13).
3. Clayware wall cladding as claimed in either of the preceding claims, characterised in that the rail (13) is of hollow, box-section.
4. Clayware wall cladding as claimed in any one of the preceding claims characterised in that the rail (13) has a downwardly sloping upper surface (25).
5. Clayware wall cladding as claimed in any one of the preceding claims, characterised in that a plurality of seating elements (16) are provided adapted to be positioned in spaced relation along the rail (13) such that each extends between two horizontally adjacent tiles (10) supported by the rail (13).
6. Clayware wall cladding as claimed in claim 5 as appendant to claim 4, characterised in that the arrangement is such that water reaching said sloping surface (25) of the rail (13) will be shed between adjacent ones of said seating elements (16) to a position in front of tiles (10) constituting a horizontal course next below that supported by the rail (13).
7. Clayware wall cladding as claimed in any one of the preceding claims comprising two horizontal courses of similar tiles (10) one above and the other below the rail (13), characterised in that the lower part of the rail (13) has a downwardly-opening concavity (20) to receive a cranked, upper formation (23) of each tile (10) of the course below the rail (13) such that outer surfaces of the tiles (10) of the two courses lie generally in the same plane.

8. Clayware wall cladding as claimed in claim 7, characterised in that the upper extremity of each said cranked portion (23) of a tile (10) has a forwardly extending nib (23) located above a rearwardly extending nose (19) bounding the forward side of said concavity (20) of the rail.

9. Clayware wall cladding as claimed in claim 7 or claim 8, characterised in that said concavity (20) of the rail (13) is bounded to the rear by a downwardly and forwardly extending flange (21) which contacts the rear surfaces of the cranked portions (23) of the tiles (10) below the rails (13).

10. Clayware wall cladding as claimed in claim 5, or any one of claims 6-9 as appendant to claim 5, characterised in that each seating element (16) has an upward projection (32) in front of the downstand (34) of each nib (12) supported thereby such that, with a seating element (16) located between a tile (10) and the rail (13) by which it is supported, said tile (10) cannot be lifted sufficiently for the downstand (34) of its nib (12) to clear said upward projection (32) before the cranked upper region (23) of said tile (10) encounters the underside of the rail (13) next above, and characterised in that the seating elements (16) are slideable along the associated rails (13) to permit the two seating elements (16) supporting a given tile to be moved laterally away from the tile (10) along the associated rail (13), after which said tile (10) may be first lifted and then swung outwardly of the screen to permit its removal.

11. Clayware wall cladding as claimed in claim 10, characterised in that the seating elements (16) each have a flat supporting surface (31) extending rearwardly behind said upward projection (32) thereof, the supporting surfaces (31) of at least some of said seating elements (16) being divided by an upstanding partition (35) located between the two tiles (10) supported thereby, the arrangement being such that said at least some seating elements (16) cannot be slid along the associated rail(s) (13) until one of said two tiles (10) has been removed.

12. Clayware wall cladding as claimed in claim 11, characterised in that none of the seating elements (16) associated with one vertical row of the tiles (10) making up the screen is provided with a said partition (35) such that seating elements (16) associated with the tiles (10) of said row only may be slid away from said row without first removing any tile (10) from the screen.



13. Clayware wall cladding as claimed in any one of claims 10 to 12, characterised in that the arrangement is such that the seating elements (16) are accessible from in front of the screen through the gap (41) between the cranked upper region (23) of a tile and the lower edge of the tile (10) immediately above and characterised in that a tool (36) is provided which has an elongate operating part (37) at right angles to a shank (38), the operating part (37) being insertable in said gap (41) between two adjacent seating elements (16) while held in a horizontal attitude and then rotated to a vertical attitude in which it may be moved laterally to displace a seating element (16) along the associated rail (13).

14. Clayware wall cladding as claimed in claim 13 as appendant to claim 12, characterised in that the seating elements (16) associated with said one vertical row of tiles (10) each is identifiable from in front of the rainscreen through the associated said gap (41) by means of markings, coloration or the like which distinguishes seating elements (16) having partitions (35) from seating elements (16) lacking the same.

15. A method of assembling a clayware rainscreen which comprises locating vertically spaced rails (13) in front of an inner structure to be clad by means of brackets (14) each slideable along the associated rail (13) and locating on each rail a horizontal course of clayware tiles or the like (10) by means of a nib (12) extending rearwardly of each tile (10) and having a downstand such that upper, cranked regions (23) of the tiles of a lower course are received in a downward concavity (20) of the rail (13) on which the course next above is located and such that front surfaces of all of the tiles (10) lie generally in the same vertical plane, characterised in that seating elements (16) more resilient than the rails (13) are slideably located thereon and moved therealong to positions in which each seating element (16) will support adjacent corners of the nibs of adjacent tiles (10) in a course with a gap between adjacent seating elements through which rainwater may escape to the front of the screen.

16. A method as claimed in claim 15, characterised in that the seating elements (16) have flat supporting surfaces (31) all but some of which are divided by a partition (35) which will extend into the gap between the two tiles (10) supported thereby, and characterised in that said some seating elements (16) each lacking a said partition (35) are selected to support the tiles (10) making up one vertical row of the tiles, in the case of all other vertical rows of tiles (10) the seating elements (16) being slid under exposed lateral edges of the tiles until abutted by the partitions (35) and in the case only of said one vertical row the seating elements (16) lacking partitions (35) being slid from beneath tiles adjacent said row to positions where they will support the tiles of said row.

17. A method as claimed in claim 16 and comprising inserting a tool (36) into the gap (41) between vertically adjacent tiles (10) of said one row or in the gap (41) between vertically adjacent tiles of an adjacent row and utilising the tool (36) to slide seating elements (16) lacking partitions (35) either beneath or away from the corners of tiles (10) making up said one row.

18. A method as claimed in any one of claims 15-17 characterised in that the tolerances are such that a tile (10) cannot be removed from the screen while seating elements (16) are beneath it but such that a tile can be lifted to permit a seating element (16) to be slid under or away from the tile.

19. Clayware wall cladding as claimed in any one of claims 1-14 or made by the method of any one of claims 15-18 and comprising horizontal courses of clayware tiles or the like (10) supported by respective, horizontal rails (13) such that the tiles form vertically-aligned rows between any two of which a vertical gap (50) exists which is substantially filled by a vertical spacer element (40), characterised in that the spacer element is made up of individual portions (40) of its length, each said portion (40) bridging a respective one of the horizontal intervals (41) between the tiles (10) of one course and the tiles (10) of the course next above or below it, each said portion (40) being held in position commonly with another portion (40) above or below the same by a location element (42) which engages the rail (13) nearest to said horizontal interval (41), each said location element (42) comprising a head portion (43) to engage said rail (13) and a tail portion (44) depending from said head portion, said tail portion (44) comprising means (45) to retain one end of each of two spacer element portions (40) extending respectively upwardly and downwardly from the location element (42).

20. Clayware wall cladding as claimed in claim 19 as appendant to claim 7, or any one of claims 8-14 as appendant to claim 7, characterised in that the downwardly-opening concavity (20) of each rail (13) has a relatively restricted, horizontally elongated opening and the head portion (43) of each location element (42) is shaped such that it may be inserted into said concavity (20) from below with said location element (42) in a first attitude after which the location element (42) may be rotated through 90° to a second, operative attitude in which the head portion (43) is trapped in the concavity (20).

21. Clayware wall cladding as claimed in claim 19 or claim 20, characterised in that the said retaining means (45) of each said location means tail portion (44) comprises

oppositely-opening channels (46,47) into each of which a respective end of a spacer element portion (40) may be slid laterally.

22. Clayware wall cladding as claimed in any one of claims 19 to 21, characterised in that each said location means tail portion (44) comprises lateral fins (48,48') which, in the operative position of the location means (42) , extend downwardly and inwardly with respect to the tiles (10) next below the head portion (43) of said location means so as to deflect toward the rear faces of the same any water penetrating the said horizontal interval (41).

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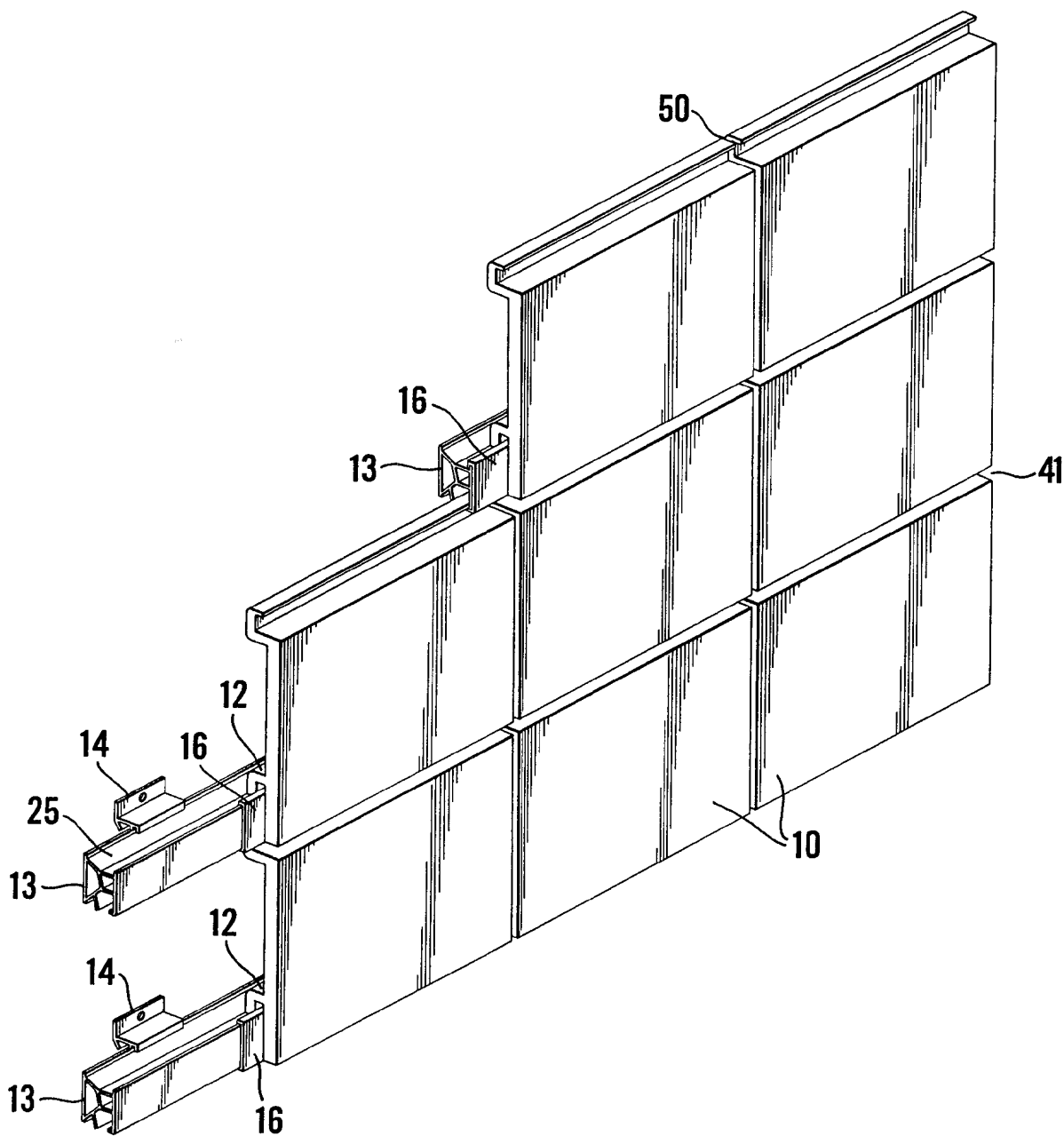


Fig. 1

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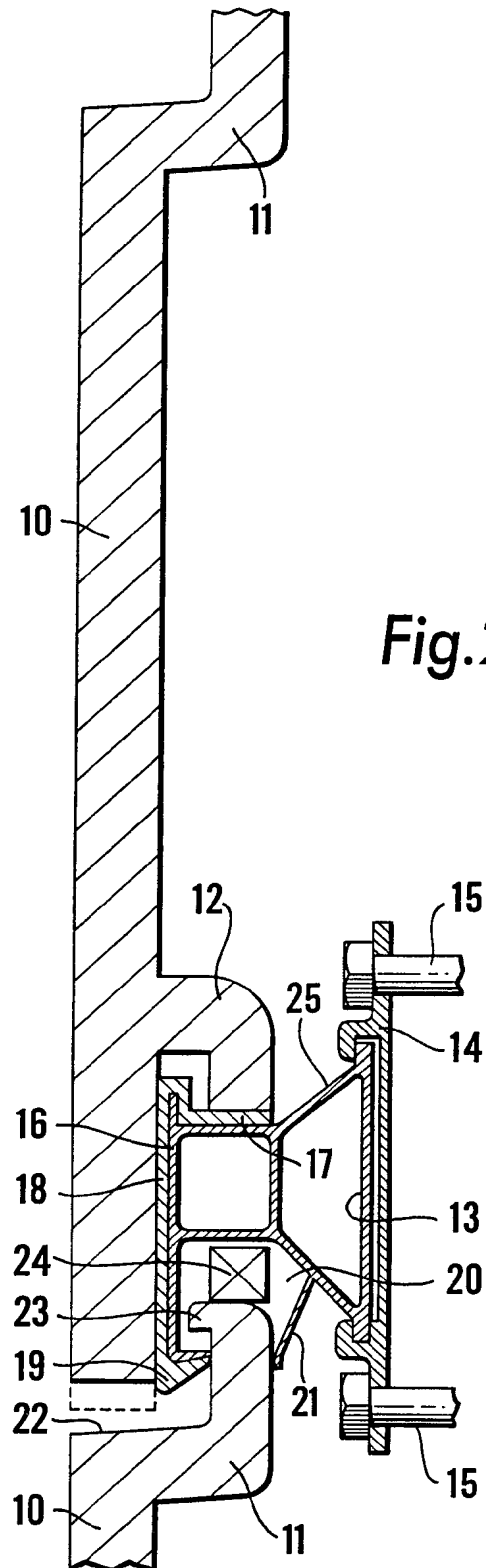


Fig.2

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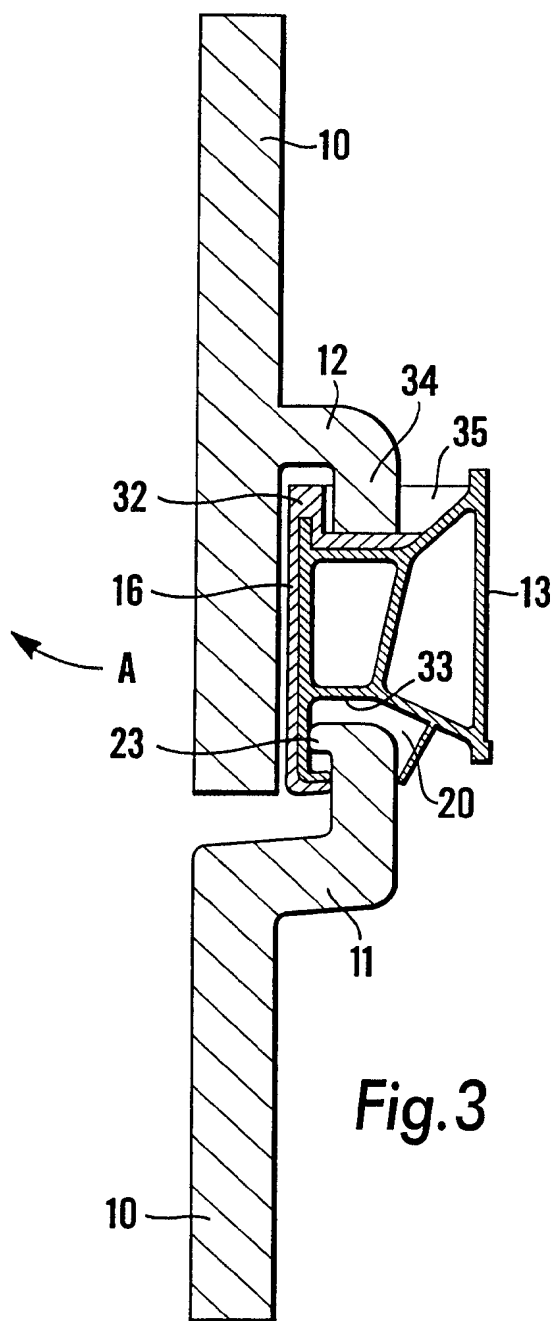


Fig. 3

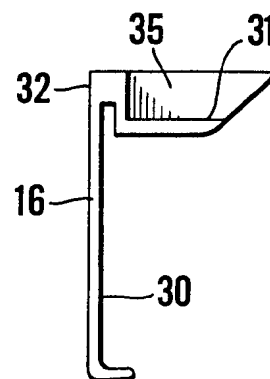


Fig. 4A

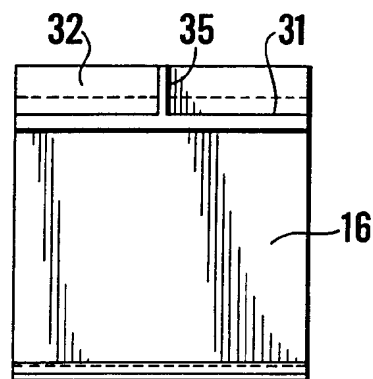


Fig. 4B

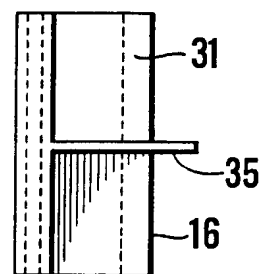
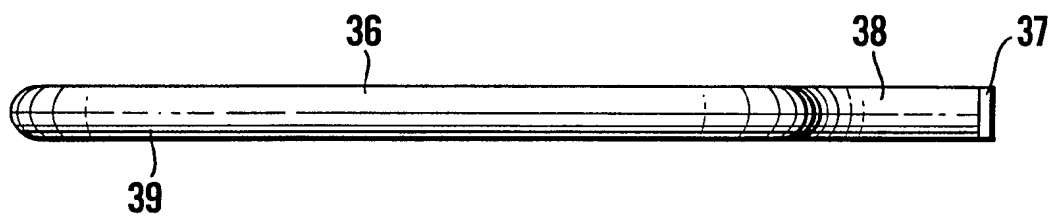
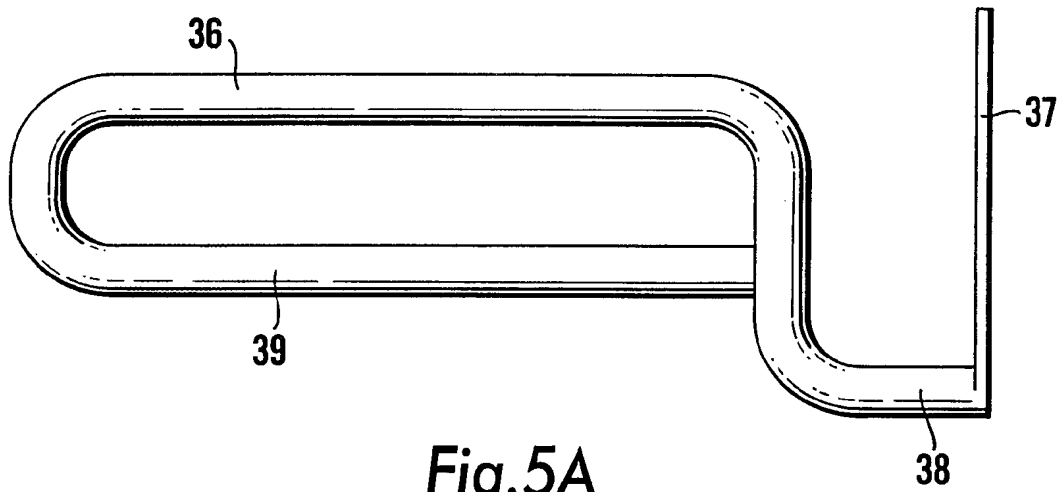


Fig. 4C

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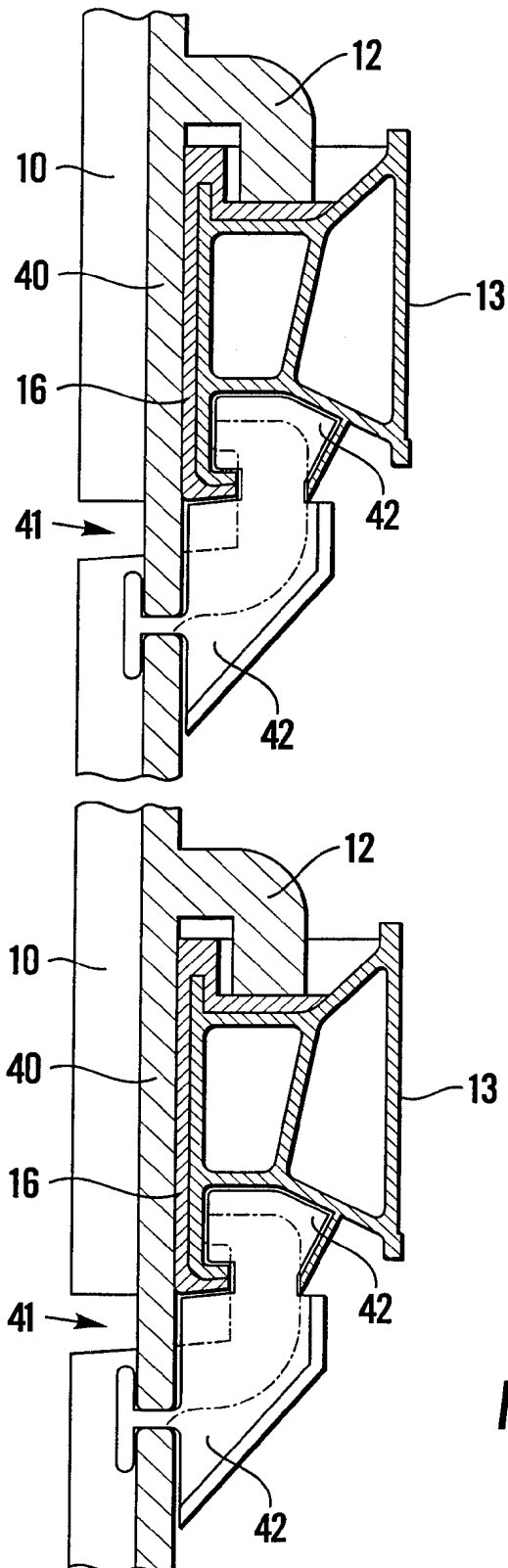


Fig.6





# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 97/03382

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 E04F13/08

According to International Patent Classification(IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 E04F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 155 970 A (NIPPPN LIGHT METAL CY.) 2 October 1985	1,5
A	see page 2, line 67 - page 7, line 74; figures	7-9,12, 19,21
X	GB 2 108 173 A (GOMEI KAISHA OSAWA SHOTEN) 11 May 1983	1,2
	see page 1, line 77 - page 2, line 41; figures 1-11	
X	FR 2 562 591 A (GENERAL BATIMENT) 11 October 1985	1
	see page 2, line 29 - page 4; figures	
A	FR 2 553 454 A (ROCAMAT) 19 April 1985	1,6,10, 12
	see page 2 - page 6; figures	
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

20 March 1998

Date of mailing of the international search report

30/03/1998

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# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 97/03382

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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A	DE 25 59 312 A (HERRFELD) 14 July 1977  see page 10, last paragraph - page 15; figures ---	1,3,19, 21
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